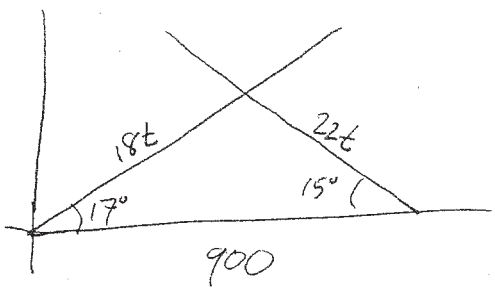
Trigonometry 0809

Parametrics 6.3

(12d)



The thing that makes this difficult is that the times the two ships reach the intersection point are different.

$x_1 = 18t_1\cos 17°$ $\qquad$ $x_2 = 900 - 22t_2\cos 15°$ (starts 900 mi east)

$y_1 = 18t_1\sin 17°$ $\qquad$ $y_2 = 22t_2\sin 15°$

When they intersect the x-values will be the same so,

$$18t_1\cos 17 = 900 - 22t_2\cos 15$$

or $18t_1\cos 17 + 22t_2\cos 15 = 900$ EQ 1

Now solve for t_1 using the y_1 & y_2 equations which will also be equal at the point of intersection

$18t_1\sin 17 = 22t_2\sin 15$ $\rightarrow$ $t_1 = \dfrac{22t_2\sin 15}{18\sin 17}$

Now plug t_1 into the equation above (EQ 1) and solve

$$18\left(\frac{22t_2\sin 15}{18\sin 17}\right)\cos 17 + 22t_2\cos 15 = 900$$

$$\cancel{18}\left(\frac{22t_2\sin 15}{\cancel{18}\sin 17}\right)\cos 17 + 22t_2\cos 15 = 900 \quad \text{Factor out } t_2$$

$$t_2\left(\left(\frac{22\sin 15}{\sin 17}\right)\cos 17 + 22\cos 15\right) = 900$$

$$t_2 = \frac{900}{\left(\frac{22\sin 15}{\sin 17}\right)\cos 17 + 22\cos 15}$$

$t_2 = 22.57$ hrs

$t_1 = 24.42$ hrs

Find point of intersection (420.36, 128.52) by plugging t_1 & t_2 back into original equations.

Trigonometry | 08cq

Parametrics 6.3

(12d) $x_1 = 18t\cos 17$

$y_1 = 18t\sin 17$

solve for t in x-equation plug into y-equation (Eliminate parameter)

$t = \frac{x_1}{18\cos 17}$ $\qquad y_1 = 18\left(\frac{x_1}{18\cos 17}\right)\sin 17$

$x_2 = 900 - 22t\cos 15$

$y_2 = 22t\sin 15$

solve for t in x-eq., plug into y-equation

$t = \frac{900 - x_2}{22\cos 15}$ $\qquad y_2 = 22\left(\frac{900 - x_2}{22\cos 15}\right)\sin 15$

Now graph the 2 y-equations together in function mode using a single variable x for x_1 and x_2 because at the intersection point $x_1 = x_2$. Find the intersection using 2nd Trace.

Intersect at (420.36, 128.52)